Novel Blood Tests to Diagnose Preeclampsia: Saving the Lives of Mothers and Children

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Purpose: The aim is to develop blood tests to help identify women at high risk for Preeclampsia(PE) and confirm the suspected symptoms early in pregnancy. PE is characterized by the new onset of hypertension and proteinuria after 20 weeks of gestation, making it challenging to diagnose. Currently, PE affects 5-8% of pregnancies worldwide and is responsible for high-risk preterm delivery, IUGR, as well as maternal and perinatal morbidity and mortality. Method: ELISAs were developed to measure the circulating levels of Glycosylated Fibronectin(GlyFn), a liver protein, Pregnancy-Associated Plasma Protein A2(PAPP-A2), and other placental proteins in 10µL of maternal serum or a drop of blood on filter paper. The clinical validation was performed using serum from 447 pregnant subjects between 20-35 weeks of gestation. The measurement of these biomarkers were studied for PE diagnosis, severity of disease, and time to delivery using cohorts of control(111), PE(68), renal complication(4), and Pregnancy Induced Hypertension(73). Data: GlyFn and PAPP-A2 were the most specific and sensitive biomarkers for diagnosing PE with Area Under the Receiver-Operating-Characteristic(AUROC) of 0.98(0.96-1.01) & 0.99(0.98-0.99), respectively. GlyFn and PAPP-A2 as combination of markers resulted in AUROC of 0.998(0.99-1.00). Elevated concentrations of these biomarkers accurately predicted the severity of PE and the time to delivery. Conclusions: Inclusion of GlyFn and PAPP-A2 blood tests to the current PE diagnosis (by ACOG) will help confirm the diagnosis of Preeclampsia with >98% accuracy. These low-cost and user-friendly tests open avenues for testing in remote areas, significantly reduce hospitalization cost, and save many mothers and children's lives.

Awards Won:

Serving Society Through Science: Second Award of $500

Arizona State University: Arizona State University Intel ISEF Scholarship